

STEREUMS WITH ACANTHOPHYSES,
THEIR POSITION AND AFFINITIES

J. BOIDIN*, E. PARMASTO**, G. S. DHINGRA*** & P. LANQUETIN*

Stereum peculiare spec. nov. and *S. reflexulum* Reid are described. Two new subgenera are distinguished in the genus *Stereum*: subg. *Aculeatostereum* and subg. *Acanthostereum*. The authors compare them with other genera having acanthophyses.

The genus *Stereum* S. F. Gray emend. Boid. 1958 is restricted to species having smooth, amyloid, and binucleate spores, dimitic basidiocarps without clamps and with pseudocystidia; it is also characterized by a holocenocytic nuclear behaviour with sparse, opposite or verticillate clamps on the bigger hyphae of mono- and polysporous cultures.

In this genus, Bourdot & Galzin (1921) distinguished two sections — section *Luteola* which contains the type species and section *Cruentata* for the species which redden upon injury. The distinction between the species is based on external appearance, while microscopic characteristics are rarely used because they display little variation.

As far back as 1960 Boidin (p. 67, note 6) proposed the term 'pseudoacanthophyses' for those sterile, aculeolate elements which replace the basidioles, have the same size but bear a few short outgrowths at their apex. True acanthophyses or acanthohyphidia, called 'bottle-brush paraphyses' by Burt (1920), are more differentiated, with many apparently massive, cylindrical, finger-like elements, covering the top and, more or less, the sides. These elements can be observed in many species of *Aleurodiscus* subg. *Aleurodiscus* and subg. *Acanthophysium* Pilát 1926 and with a more regular shape, in all members of *Aleurodiscus* subg. *Aleurobolus* Boid. & al. (1968), as well as in the genus *Xylobolus* and, as we will see, in various species of *Stereum* sensu stricto such as *Stereum peculiare*, and *S. reflexulum* Reid (1969) abundantly collected in the Mediterranean island of Port-Cros (France), both of which are described below.

Stereum peculiare Parmasto, Boidin & Dhingra,
spec. nov. — Figs. 1, 2

Carpocoma resupinatum vel *resupinato-reflexum*, dense coriaceum; pileus (pars reflexa) ad 5(–10) mm lat. Superficies pilei tomento vestita, mellea, deinde subglabra, radiato-striata, fuscescens, ultimo fusco-nigra. Hymenophorum impar, sparse et irregulariter aculeatum (hydnoideum) vel processibus digitiformibus,

* Laboratory of Mycology associated with C.N.R.S., Université Claude Bernard, 43 Boulevard du 11 novembre 1918, 69622, Villeurbanne, France.

** Institute of Zoology and Botany, 21 Vanemuise str., Tartu 202400, Estonian S.S.R.

*** Department of Botany, Panjab University, Chandigarh 160014, India.

fulvo-ochraceum, posterius (in statu sicco) profunde rimosum. Denticuli 0.5–2 mm alt., 0.2–1 mm diam.

Systema hypharum dimiticum. Hyphae generatoriae tunicis tenuibus vel incrassatis, septis numerosis, efibulatae, 4–5.5 μ m diam. Hyphae skeleticae crasse tunicatae vel paene solidae, flavo-brunneae, 4.5–6 μ m diam.: apices hypharum deorsum revoluti in hymenio pseudocystidia immersa clavata apice rotunda 6–8 μ m diam. vel digitis acanthophysoideis praedita constituentes. Scetocystidia pauca immersa, obpyriformia, crasse tunicata, 25–50 \times 10–17 μ m. Acanthohyphidia multa 30–100 \times 3.5–7(–10) μ m in parte superiore cum processibus 2.5–7 μ m longis. Sporae cylindratae, leviter arcuatae, parietibus laevibus amyloideis, (9–)10–12.8(–14,2) \times (2.5–)3(–4) μ m.

Typus: U.R.S.S., in regione Primorskij, distr. Kavalerovskij, Gornoretshensk, ad ramum Quercus mongolicae dejectum, 9.X.1977, legit E. Parmasto (TAA no. 101 895).

Basidiocarps effused or with narrowly reflexed pilei, annual (?), adnate or with almost free margins, densely coriaceous, pliable, arising as small patches 0.3–3 cm in diam. which soon become confluent and may become effused up to 20 cm long, 0.3–1 mm thick in section; the initial points distinct.

Pileus narrow or rarely almost semicircular, up to 5(–10) mm wide, 0.5–2(–3) mm thick. Upper surface covered with thick tomentum, faintly concentrically zonate, greyish apricot (Munsell 10 YR 7/6 or 8/6; Methuen 5C6) with somewhat darker indistinct zones; tomentum disappearing soon and surface subglabrous, radially striate, almost silky smoke grey (Munsell 10 YR 7/1 or 7/2; Methuen 5B2–5C2) with narrow whitish edge, darkening with age, almost fuscous black (Munsell 10 YR 3/1 or 3/2; Methuen 5F5). Margin of the resupinate part determinate, thinning out, a narrow band (up to 0.3 mm, rarely 0.5 mm) white or whitish, becoming concolorous with hymenium with age. Hymenial surface uneven, tuberculate, with rare or scattered irregular finger-like outgrowths or toothed, rarely almost smooth, golden brown or fulvous ochraceous (Munsell 10 YR 5/8 – 6/8 or 7.5 YR 5/7; Methuen 5D6–5D7), old specimens becoming deeply radially cracked on drying. Teeth 0.5–2 mm long, 0.2–1 mm broad at the base, broadly conical or irregularly cylindrical, obtuse, sometimes flattened, often confluent at their bases, sometimes forming toothed ridges. Context distinctly layered, composed of loose cottony tomentum (basal zone of resupinate specimens) concolorous with young upper surface, and almost suberose buff (Munsell 10 YR 9/4) main layer separated by a narrow dark line.

Hyphal system dimitic. Tomentum thick in young specimens, very thin in old ones, composed of loosely woven, olive brown, thick-walled, sparsely branched hyphae with rare septa, 4–5.5 μ m in diam. Cuticular layer distinct, 40–100 μ m thick, of densely arranged, almost parallel, brown, thick-walled hyphae, agglutinated with resinous matter. Context layer composed of compactly radiately arranged parallel hyphae, curved into the subhymenium. Generative hyphae abundant, with thin or thickened walls, frequently septate (without clamps), slightly yellowish or almost yellow, 4–5.5 μ m in diam. Skeletal hyphae usually small in number except in the upper part of the context or at the bottom of the 'processes', thick-walled or almost solid, with rare septa, dark honey-yellow or yellow-brown, 4.5–6 μ m in diam; some skeletal hyphae curve into the subhymenium and hymenium as immersed indistinct 'pseudocystidia' having rounded, slightly or sometimes distinctly clavate tips, 6–8 μ m in diam. Mostly they end obliquely in the subhymenium as acanthophyses with rough diverticules. Subhymenium thin, composed of almost perpendicularly arranged, thin-walled, branched, dark yellow generative hyphae 4–5.5 μ m in diam.; gloecystidia rare (more frequent in Indian specimen), immersed in subhymenium and hymenium, obpyriform, moderately thick-walled (up to 2 μ m), sometimes with thin-walled rostrate upper part, 25–50 \times 10–17 μ m, rarely with 1–2 secondary septa, contents negative with sulfo-aldehyde. Hymenium composed of very abundant acanthohyphidia, basidioles (hyphidia?) and scattered basidia. Acanthohyphidia subclavate, subfusiform or subcylindrical, some rather irregular, with a basal septum, sometimes with secondary septa, thin-walled, in old hymenium thick-walled, and brownish, 30–100 \times 3.5–7(–10) μ m, covered with naked spines or digitate processes in the apical third; spines densely arranged, 2.5–7 μ m long. Basidioles few, thin-walled, with rounded apex, 2–3.5 μ m in diam. Basidia rarely seen,

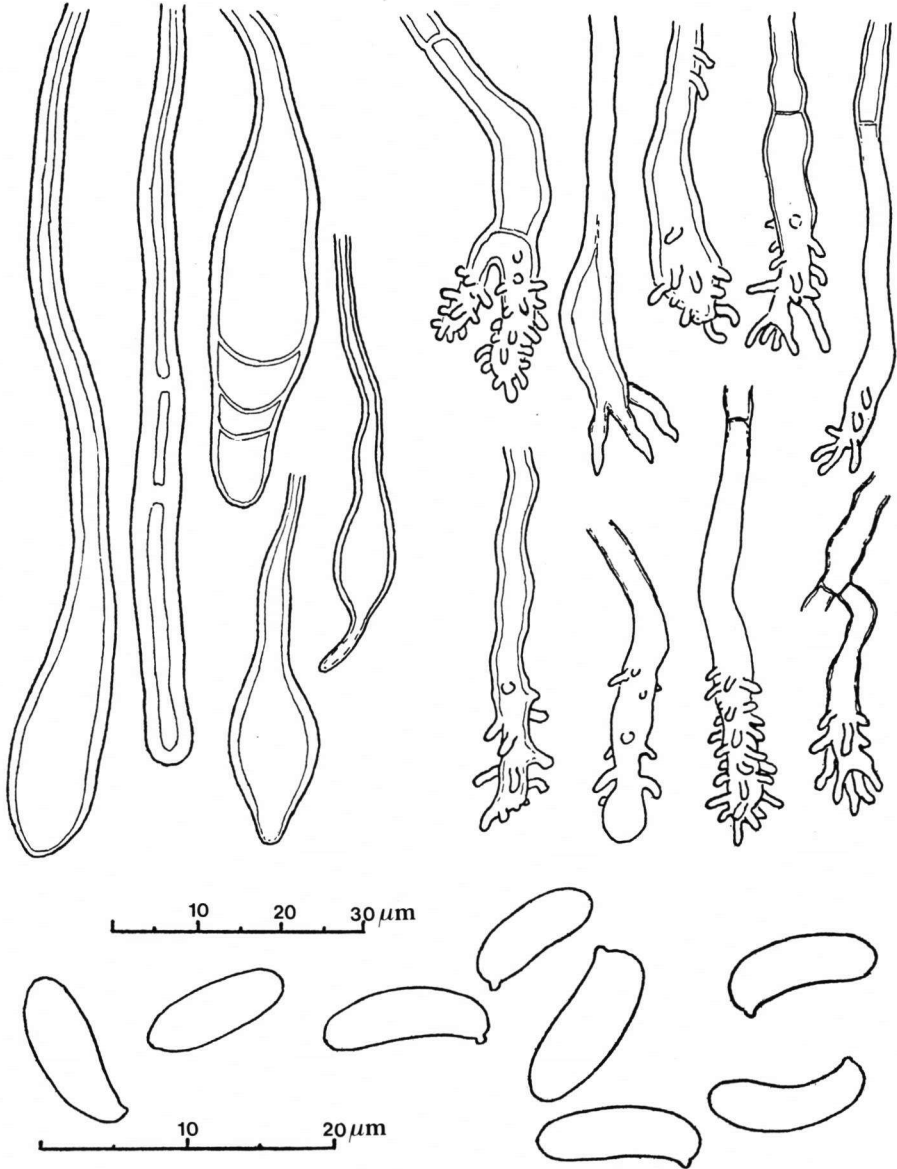


Fig. 1. *Stereum peculiare*: pseudocystidia, acanthohyphidia, and spores.

clavate, somewhat sinuate, $30-40 \times 7-8 \mu\text{m}$, with 4 conical sterigmata, $4-5 \mu\text{m}$ long. Spore print white. Spores cylindrical, slightly curved, smooth, with thin, amyloid walls, $(9-10-12.8(-14.2) \times (2.5-3(-4) \mu\text{m}$.

All microscopical elements acyanophilous and not markedly coloured by sulfovanilline; all elements except spores non-amyloid and non-dextrinoid.

Associated with an intensive white rot; decayed wood fibrillose.

Type: U.S.S.R., Primorskij Terr., Kavalerovo Distr., Gornoretshensk, on fallen branch of *Quercus mongolica*, *E. Parmasto* 9 Oct. 1977 (holotype: TAA 101 895; isotype: LY 8630).

SPECIMENS EXAMINED. — U.S.S.R., near the holotype's locality, *E. Parmasto* 9 Oct. 1977 (TAA 101 891 and LY 8629); Primorskij Terr., Hasanskij Distr., near the lake 'Karasj', *L. N. Vassilyeva* 2 Oct. 1963 (TAA 97 398 and LY 4828); Primorskij Terr., Lazo Distr., Lazo Nature Reserve Area, *E. Parmasto* 6 Sept. 1961 (TAA 15 326 and LY 4338); India: in a forest with *Michelia champaka* dominating, Sirohi, Ukhrlul, Manipur, Chandigarh herbarium, 2 Sept. 1978, PAN 190093 and LY 9250.

The new species microscopically is somewhat similar to *Stereum acanthophysatum* Rehill & Bakshi which, according to the description given in Rattan's paper (1977: 158), has a smooth to finely tuberculate hymenial surface, conducting hyphae containing orange coloured contents, acanthophyses, $15-20 \times 3-4.5 \mu\text{m}$, and ellipsoid spores $6-9 \times 3.5-4.5 \mu\text{m}$.¹

The 'pseudocystidia' of *Stereum peculiare* arise from the skeletal hyphae; their contents are neither markedly coloured nor changing colour in sulfovanilline. There are transitions from these cystidia to the obpyriform gloecystidia.

The spore print was obtained from the type specimen in room conditions during the night after collecting; during the microscopical study of the herbarium specimens (including the type) only few basidia and spores were seen. The average measurements of 50 spores from the spore print, were $10.60 \pm 0.74 \times 3.39 \pm 0.25 \mu\text{m}$ for the type. For the paratypes we found the following values.

	N	$\bar{x} \pm s$	extremes
TAA 101.891	30	$10.17 \pm 1.08 \times 2.87 \pm 0.21 \mu\text{m}$	$8-13.5 \times 2.5-3.5 \mu\text{m}$
TAA 97.398	30	$11.70 \pm 0.75 \times 2.96 \pm 0.15 \mu\text{m}$	$10.5-14 \times 2.5-3.2 \mu\text{m}$
TAA 15.326	40	$12.75 \pm 0.99 \times 2.73 \pm 0.14 \mu\text{m}$	$10-14 \times 2.2-3 \mu\text{m}$

It is worth while noticing here the great resistance of this fungus: the specimen TAA 97.398 collected 2 Oct. 1963 gave a good spore print upon its arrival in Lyon in June 1964.

All East Asian specimens mentioned above were collected in broad-leaved forests of tertiary relict type in the southern part of the Soviet Union Far East region, which has a very rich fungal flora with many species in common with Japan¹ and North America.

¹ Before publishing this new species, we would have liked to obtain the loan of *Stereum kurilense* Yasuda. Unfortunately our requests remained unanswered. These specimens might have been destroyed during World War II.

According to the description reported by Ito (1955), *S. kurilense* differs from *S. peculiare* by its smooth, white or wood-coloured hymenium and by the more dumpy aspect of its spores.

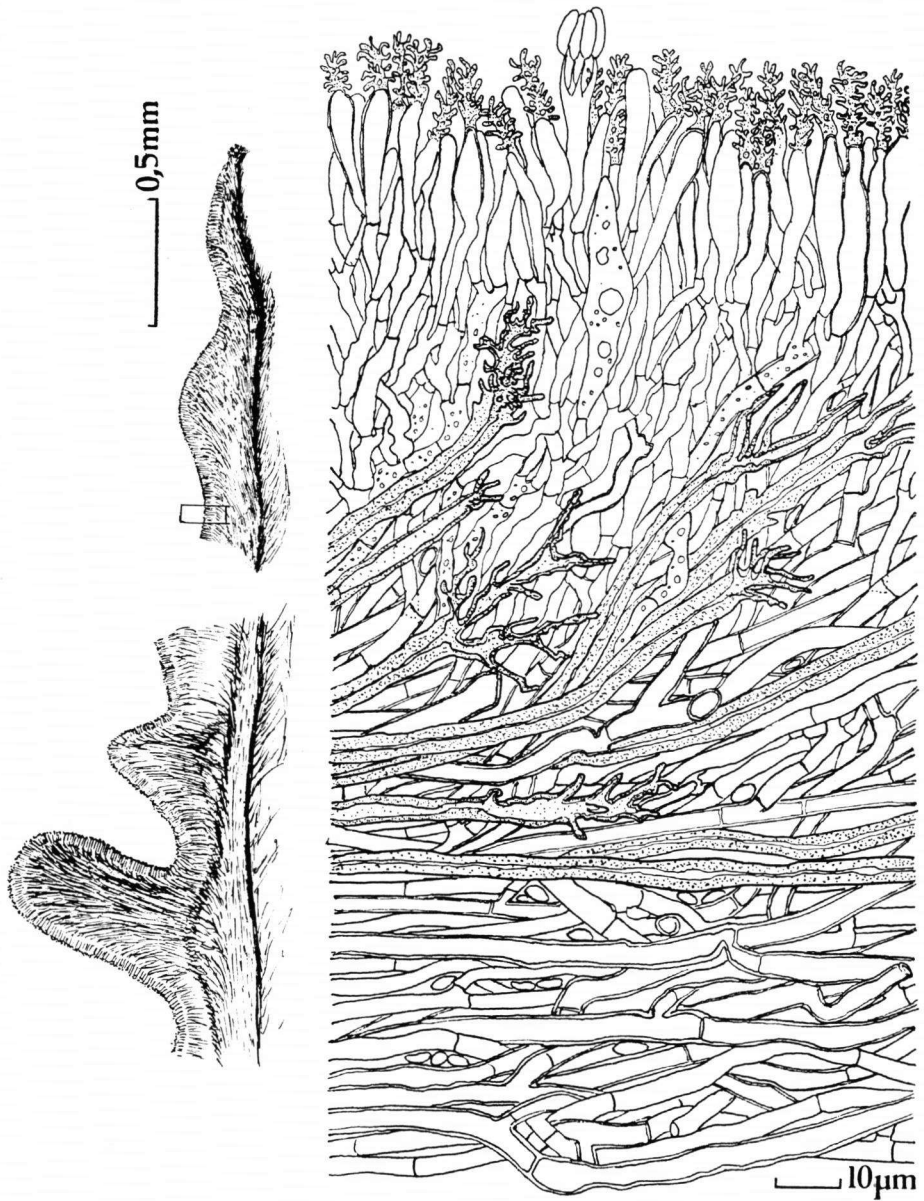


Fig. 2. *Stereum peculiare* (type): schematic section through fruit-body and detail of a part.

CULTURAL CHARACTERS OF STEREOUM PECULIARE

LY 4338 and 4828, paratypes.

SPORES.—Binucleate.

GERMINATIONS.—The LY 4338 specimen, received at Lyon in October 1962, gave a spore print from which we were able to isolate a very small number of monosporous cultures. In December 1964, from the same spore print kept at 4 °C since 1962, we obtained germinations and several new monosporous cultures. In June 1964, upon arrival at Lyon, basidiocarp LY 4828 produced a spore print from which many germinations were obtained; unfortunately none of the 56 isolated germinations grew, but 4 months later, new germinations were obtained, 48 hours after sowing under collodion-films. Young germinations are cenocytic and show no septa at the 7 to 13 nuclei stage.

MONOSPOROUS CULTURES.—LY 4338: 6 monosporous mycelia out of 17 show very rare clamps, simple or opposite on the bigger hyphae, after patient research in cultures on agar slides or in Petri-dishes filled with sawdust medium. Their hyphae are composed of multinucleate articles, the terminal article contains 17 to 30 nuclei, following articles, 10 to 12, and near the centre of the culture, articles have 3 to 7 nuclei.

LY 4828.—All of the 33 monosporous cultures, sowed on a medium of sawdust, show rare clamps, they are single on 3.5–4 µm wide hyphae, opposite on hyphae 4 µm wide, verticillate in threes on hyphae 5 µm wide and verticillate in whorls of four on hyphae 6 µm wide. Their hyphae are composed of multinucleate articles, containing 7–18(–22) nuclei near the centre, while terminal articles contain 110–250 nuclei. Simple or opposite clamps have been observed in culture under the collodion-film.

POLYSPOROUS CULTURES.—LY 4338, 4828.

GROWTH.—Moderately rapid (petri-dishes covered in 4 weeks). Rate of growth was the same both in 1978 and in 1964.

ASPECT.—Margin regular, slightly elevated. Young aerial mycelium cottony, more or less woolly, loose. After 6 weeks white aerial mycelium low, felted or on the contrary formig big white cottony masses tinged very pale alutaceous (Munsell 10 YR 9/2). To the side of the petri-dishes a roll-like zone was observed (Munsell 7.5 YR 4/3). Reverse unchanged. Fruity odour. A four months old culture shows a peripheral zone coloured M 7.5 YR 6/4, with M 7.5 YR 5/4 patches.

MICROSCOPICAL CHARACTERS.—Aerial mycelium: numerous fine branches 1–2 µm wide, axial hyphae 3–6 µm wide with thin walls and rare single clamps in LY 4338; more frequent, opposite or verticillate by 3 in LY 4828. A few axial hyphae with thickened walls, 0.5–1 µm in hyphae 5–6 µm wide.

Some broad hyphae 5–8 µm wide with homogeneous, yellowish, faintly refringent contents. These hyphae also have rare, single, opposite or verticillate clamps in LY 4828.

SUBMERGED MYCELIUM.—Hyphae 2.5–5 µm wide with thin or clearly thickened walls in certain axial hyphae. Whereas LY 4338 has no clamps on hyphae deeper in the medium, submerged hyphae of LY 4828 possess single, rare, or verticillate clamps like those of the aerial mycelium.

CYTOLOGY.—Hyphae with rare clamps are composed of articles containing (2)–4–10(–15) nuclei, except the terminal one which is generally longer and contains 28–70(–94) nuclei.

OXIDASES.—

gallic acid: + + + + +, 15 mm

p.-crésol: —

gaiacol: + + + +, 0

tyrosine: — ou + (LY 4828)

: + + (+ +) (LY 4338)

CODE.—2(a) – 5 – 32 – 36 – 38 – 44 – 53 – 54 – 57 – 66.²

² Nobles (1965) completed by Boidin (1966).

In contrast to mycelia of *Xylobolus* species which we studied earlier (*X. frustulatus*, LY 4420, U.S.S.R., Transcaucasia, leg. *Parmasto*, *X. subpileatus*, LY 4421, U.S.S.R., Transcaucasia, leg. *Parmasto*, *X. princeps*, LY 4393, India, leg. *Bakshi*, and *X. sepium*, LY 6333, Tennessee (U.S.A.), leg. *Boidin*), the mycelium of *S. peculiare* has a strong positive reaction with guaiacol and does not blacken in sulphuric acid.

STEREUM REFLEXULUM Reid—Fig. 3

Stereum reflexulum Reid in Rev. Mycol. (Paris) 33: 262. 1969 [1968].

Reid's original description was based on a hardly reflexed specimen whereas M. Tortić (1975) published a photograph of a Yugoslavian 'fan-shaped' specimen. Approximately fifteen collections were made in the Park of Port-Cros, France, which show that forms of such extreme habit as mentioned above are connected by many intermediates. This interesting and long mistaken fungus is described below.

Habitus very variable, either completely effused on large horizontal supports or on the contrary reflexed, the reflexed parts 1.5–2 cm in diam., imbricate or still umbonate-affixed when attached to vertical or oblique substrata especially small branches. Upper surface of the concentrically furrowed reflexed parts hirsute by greyish tufts through which shows the dark cortex which is M. 5 YR 4/4, chocolate (M. 5 YR 3/3), havane (M. 7.5 YR 5/6) but becomes chestnut-brown with age (M. 2.5 YR 3/6, 3/4 and even 2/2); margin narrow, pale alutaceous (M. 10 YR 9/5). Hymenial surface with a narrow whitish margin which darkens after bruising without reddening, smooth, somewhat zonate, beige (M. 10 YR 7/3), chamois beige (M. 10 YR 7/4), light yellowish brown (M. 10 YR 6/4) or beige reaching isabellinus (M. 7.5 YR 7/2, 7/4), then cinnamon (M. 7.5 YR 6.5/4–6/4), near the centre, light reddish brown (M. 5 YR 6/3 and even 5.5/3.5). Reflexed parts in dried specimens hard, appressed parts densely cracked; hymenium pale, extreme margin pale alutaceous (M. 10 YR 8/4, 7.8/4, 8/3) with beige zones (M. 10 YR 7/3); the slits showing a chamois coloured substance (M. 10 YR 7.5/6); upper surface of reflexed parts sterile, bristled with whitish tufts on the sides, then furrowed with hirsute strigose bands reaching 'pale shadow' (M. 10 YR 6/4) but becoming greyish with age, disappearing and finally showing a black crust.

Basidiocarp 220–380 μ m thick, tomentum up to 300 μ m thick. Cortex very dark, 40–50 μ m thick, composed of brown generative and skeletal hyphae stuck together. Tomental hyphae brown at their base, rapidly becoming hyaline terminally, regular, thick-walled with narrow lumen, 3–4.5 μ m wide, rarely branched, agglomerated into acute tufts. Context developed in both the appressed and reflexed parts, subhyaline or slightly yellowish, composed of generative and skeletal hyphae. Generative hyphae 3–3.8 μ m wide, thin- to distinctly thick-walled, branched and septate, without clamps. Skeletal hyphae numerous, subhyaline, 3.5–6 μ m wide, very thick-walled, with narrow lumen (observed in ammoniacal Congo).

Hymenial zone 40–80 μ m high, likewise composed of generative and the tips of numerous skeletal hyphae. Generative hyphae at first oblique, later becoming vertical, 2.8–3.2 μ m wide, often slightly thick-walled. Skeletal hyphae curved to form pseudocystidia which are of various lengths, 50–180 μ m, cylindrical, slightly widened at their end, 5–6 μ m wide, the tip often rounded, rarely mucronate, with the wall generally very thick almost up to the tip where it suddenly becomes thin; cytoplasm granular with oil drops sometimes slightly brown, turning green in sulphuric acid but giving no reaction in sulpho-aldehyde reagent. Short cystidia 24–40 \times 4.5–5.5 μ m vertically borne on branching subhymenial generative hyphae which bear also basidia and acanthophyses. Actually, these short cystidia are only much shortened skeletal with

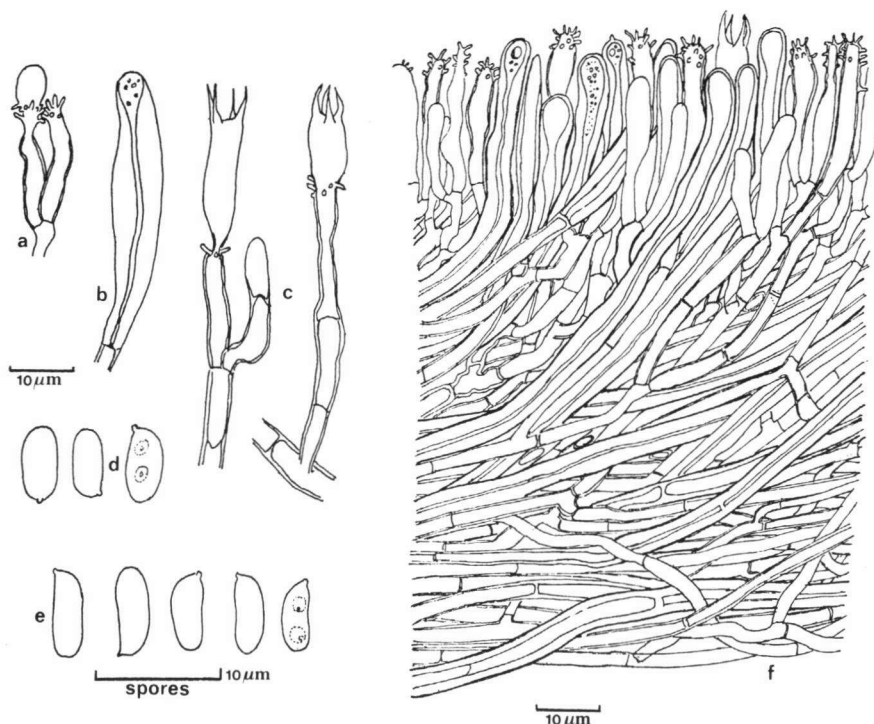


Fig. 3. *Stereum reflexulum*. — a. Acanthophyses. — b. Short hymenial cystidia. — c. Acanthobasidia (a, b, and c from LY 8342). — d. Spores (LY 8486, on *Myrtus communis*). — e. Spores (LY 8450, on *Arbutus unedo*). — f. Detail of section through fruit-body, showing the hymenium (LY 8478).

the same kind of wall becoming suddenly thinner at the tip, and the same contents. Acanthophyses numerous, cylindrical, $18-25-40 \times 3-4-5.5 \mu\text{m}$, of hymenial origin, with slightly thickening walls, apically with abundant (8–30) hyaline outgrowths up to $3 \times 0.75 \mu\text{m}$.

Basidia usually rare, $28-40 \times 5-5.5 \mu\text{m}$, not or only little protruding ($3-5 \mu\text{m}$), bearing 4 sterigmata; they often are acanthobasidia which originate terminally as a renewed growth of the acanthophyses.

Spores cylindrical, sometimes slightly depressed, smooth, amyloid, binucleate, $5.25-7 \times 2.2-2.7 \mu\text{m}$ ($N=30$, $\bar{x}=6.28 \pm 0.4 \times 2.35 \pm 0.16$) (collected on *Arbutus*); oblong, $5-6.2 \times 2.2-3 \mu\text{m}$ ($\bar{x}=5.50 \pm 0.38 \times 2.77 \pm 0.15$) (collected on *Myrtus communis*, LY 8486). Frequently collected on the island of Port-Cros (Var, France) on dead or living *Arbutus unedo* but also on *Quercus ilex*, *Cistus monspeliensis*, *Myrtus communis*, *Erica arborea* (LY 8341 and 8342, leg. J. Beller; LY 8442, 8446–8450, 8457, 8462, 8470, 8478, 8486... leg. J. Boidin, December 1977).

This species, first described from a collection on *Cistus monspeliensis* in Corsica and reported in Tanger by Reid (1969) was found again in Tenerife (Canary Islands) and in Portugal according to Ryvar den (1974), and also reported from Yugoslavia by M. Tortić (1975). This species was compared by Reid to *Peniophora incarnata* on account of the waxy appearance, and considered to be microscopically related to *Stereum insignitum*, while Ryvar den compared it to *Stereum*

hirsutum. Although it probably is frequent around the Mediterranean, it is commonly mistaken in the field for *Stereum ochroleucum* sensu Bourd. & Galz. by French mycologists (according to Donadini, viva voce) or for *S. fasciatum* sensu auct. Europ. (= *S. subtomentosum* Pouzar) or even for *S. hirsutum*, to judge from the successive determinations of a Yugoslavian specimen in the herbarium at Vienna (Austria); this species after microscopic investigation was also mistaken for *Xylobolus subpileatus* first by Reid (1957), then by Ryvarden (1972). *Stereum reflexulum* is easily distinguished from *S. hirsutum* by its colours, from *S. insignitum* by its smaller size and less contrasting colours, from *Xylobolus subpileatus* by its thinness, flexibility, and sterile pale surface. Under the microscope, it cannot be mistaken either for *S. rameale* (= *S. ochroleucum* sensu Bourd. & Galz.) or for *S. subtomentosum*, both of which have no acanthophysis-like elements, while it differs from *S. insignitum* which possesses only pseudoacanthophyses.

Although the habit is extremely variable (resupinate, narrowly reflexed or broadly reflexed), the crevices appearing during dessiccation, especially in the non-reflexed parts, are very characteristic. These were moreover also reported both by Reid and Torti .

CULTURAL CHARACTERS OF *STEREUM REFLEXULUM*

SPORES.—Binucleate.

POLYSPOROUS CULTURES.—(LY 8341–8342).

GROWTH.—Growth moderately rapid, plates covered in three weeks. Advancing zone even and appressed.

ASPECT.—Aerial mycelium whitish (M. 2.5 Y 9.25/2), loosely arachnoid, becoming woolly with erect tufts, reaching the cover or becoming flattened. Mycelium more upright in young parts than around inoculum and tinged (M. 2.5 Y 9.25/4). Reverse unchanged. Odour fruity or none.

MICROSCOPICAL CHARACTERS.—Aerial mycelium consisting of numerous slender branches without clamps, 1–1.2(–2) μm wide, frequently branched, forming a fine mesh between wide axial hyphae, 5–7(–9) μm in diam., which show single clamps on hyphae 3 μm wide, opposite or verticillate in threes on hyphae 5–6 μm wide, and verticillate in whorls of 4 to 5 on hyphae 6–8 μm wide and even verticillate in whorls of 6 on hyphae 9 μm wide. Hyphae are regular with homogeneous content, with a thin wall except in axial hyphae where the wall often reaches 1 μm . Sulpho-aldehyde reagent gives no reaction on this mycelium.

SUBMERGED MYCELIUM.—Branches less dense, less slender, 1.5–3 μm wide, less frequently branched, regular, without clamps. Axial hyphae 4–6(–10) μm wide, frequently bearing single, opposite or verticillate clamps in whorls of 2 to 6, often thick-walled, 0.5–2 μm , with very long articles, (100–)380–880 μm .

CYTOLOGY.—Hyphae composed of multinucleate articles, containing 2–6 nuclei in secondary hyphae and 4–10(–20) nuclei in axial hyphae. Terminal articles containing 14–30 nuclei in secondary hyphae, 49–92 nuclei in axial hyphae. Single or opposite clamps are not rare even when mycelium is growing under collodion film.

OXYDASES.—

gallic acid: + + + + +, 8–10 mm

guaiacol: + + + + +, 12 mm

p-cresol: —

tyrosine: —, 0

CODE.—2 – 5 – 32 – 36 – 38 – 43 – 53 – 54 – (57) – 66.

The very conspicuous aspect of *Stereum peculiare*, notably with its irregularly ornate hymenium, might have in the past justified the creation of a monospecific genus. Its anatomy, life-cycle, and nuclear behaviour, however, agree perfectly with those of *Stereum* sensu stricto

from which it is distinguished by its (1) acanthophyses; (2) skeletal hyphae often terminating into acanthophyses; (3) irregular hymenial outgrowths which are fertile up to the apex.

Stereum reflexulum Reid itself is closer to classical *Stereum* sect. *Luteola* with which it has long been confused and from which it can be distinguished only by its acanthophyses. It forms the transition between species of *Stereum* with pseudo-acanthophyses such as *S. ostrea*, *insignitum*, *rugosum*, and *S. peculiare*. It does appear preferable to include *S. peculiare* into *Stereum*, attaching the greatest importance to the presence or lack of acanthophyses on the one hand and of pseudo-acanthophyses on the other in the subdivision of the genus.

We therefore no longer use the subdivision based on the reddening of the hymenium (sect. *Cruentata* Bourd. & Galz. 1921 = genus *Haematostereum* Pouzar). In this section the reddening is brought about by the great amount of phenolic substances and phenoloxylases, released on rupturing of the extremely brittle tips of pseudocystidia. These substances turn quickly green when brought into contact with iron salts. The non-bleeding *Stereums*, such as *Stereum* sect. *Luteola*, seem to possess the same substances but undoubtedly in appreciably smaller quantity, which results in these species turning green much more slowly with iron salts. Moreover Léger (1968), using the vegetative anastomosis method, proved that *S. insignitum*, a member of section *Luteola* with pseudo-acanthophyses, failed to make anastomoses with other species of the *Luteola* group characterized by the absence of pseudo-acanthophyses such as *S. complicatum*, *subtomentosum*, *striatum*, and *rameale*, whereas it did make anastomoses with *S. rugosum* which is a species with pseudo-acanthophyses of the section *Cruentata*. The conclusion to be drawn from this is that the presence of pseudoacanthophyses is a more significant characteristic than is reddening.

***Stereum* subgen. *Acanthostereum* Boidin, Parmasto, Dhingra & Lanquetin, subgen. nov.**

A subgeneribus Stereo et Aculeatostereo acanthophysibus praesentibus differt. Typus: *Stereum peculiare* Parmasto, Boidin & Dhingra.

The species of this subgenus have all the characters of the genus *Stereum*, such as dimitism, pseudocystidia with sulpho-aldehyde negative-contents, smooth and amyloid spores, opposite or verticillate clamps on the bigger axial hyphae of the mycelium. This subgenus is characterized by the presence of acanthophyses, type: *Stereum (Acanthostereum) peculiare*, Parmasto, Boidin & Dhingra; other species are *Sterum (Ac.) reflexulum* Reid 1969 and probably, to be confirmed by the study of the mycelial characters: *S. (Ac.) acanthophysatum* Rehill & Bakshi 1966, *S. (Ac.) spectabile* Klotzsch 1843 (= *S. radiato-fissum* Berk. & Br. 1883), and *S. (Ac.) illudens* Berk. 1845; it is important to note, however, that Refshauge & Proctor (1936) described the culture of *S. illudens* as bearing single sparse clamps whereas one culture kept in Baarn showed opposite and verticillate clamps.

***Stereum* subg. *Aculeatostereum* Boidin, Parmasto, Dhingra & Lanquetin, subgen. nov.**

A subgeneribus Stereo et Acanthostereo pseudoacanthophysibus vel basidiolis aculeatis praesentibus differt. Typus: *Stereum insignitum* Quélet.

The species of this subgenus possess all characters of the genus *Stereum* but, in addition, have pseudoacanthophyses (or aculeolate basidioles); type: *Stereum* (*Aculeatostereum*) *insignitum* Quélet 1889; other species are *Stereum* (*Aculeatostereum*) *australe* Lloyd 1913, *S. durbanense* van der Byl 1922, *S. lobatum* (Kunze ex Fr. 1830) Fr., *S. macrocystidium* Welden 1967, *S. obscurans* Burt 1924, *S. ostrea* (Blume & Nees ex Fr. 1828) Fr., *S. rugosum* (Pers. ex Fr. 1831) Fr., *S. sanguinolentum* (Alb. & Schw. ex Fr. 1821) Fr., *S. versicolor* (Swartz ex Fr. 1821) Fr., *S. zonarium* Lloyd 1917, etc.; *Thelephora concolor* Jungh. 1838, *Kneiffia coriacea* Berk. & Br. 1875, *Stereum traplanum* Velen. 1920 also belong to this group. Nearly all of these members of *Aculeatostereum* formerly belonged to section *Cruentata* Bourd. & Galz.

STEREUM SUBG. STEREUM

Species of this subgenus have neither acanthophyses nor pseudoacanthophyses. Type: *Stereum hirsutum* (Willd. ex Fr.) S. F. Gray.

Other species: *S. complicatum* Fr., *S. ochraceo-flavum* (Schw.) Ell., *S. rameale* (Schw.) Burt [sensu auct. europ., = *S. ochroleucum* Bres., = *S. hirsutum* subsp. *sulphuratum* (Berk. & Rav.) Bourd. & Galz.], *S. rimosum* var. *africanum* Talbot, *S. scutellatum* Cunn., *S. striatum* (Fr.) Fr. [= *S. sericeum* (Schw.) Sacc.], *S. styracifluum* (Schw. ex Fr.) Fr., *S. subtomentosum* Pouz., *S. vellereum* Berk., *S. zebra* Heim & Malençon.

We would like to present a comparative table of genera and subgenera containing species with acanthophyses:

(1) Genera or subgenera whose species have true acanthophyses: genus *Xylobolus*, *Stereum* subg. *Acanthostereum*, *Aleurodiscus* subg. *Aleurobolus* Boid. & Coll. 1968 (with small and smooth spores).

(2) Subgenera whose species may possess acanthophyses: *Aleurodiscus* subg. *Aleurodiscus* (with big, pink and ornamented spores), *Aleurodiscus* subg. *Acanthophysium* (with white ornamented spores); in these two subgenera, acanthophyses have a much more irregular shape. We would like to add *Aleurodiscus delicatus* Wakef. which Oberwinkler (1965) indicated as the type of the monotypic genus *Acanthobasidium*, placing it in the family of Xenasmataceae on account of its pleurobasidia; these basidia at a young stage look like small acanthophyses but will develop aculeolate basidia (acanthobasidia). Without opening the debate on the systematic value of the pleurobasidium, it should be noted that non-pleurobasidial acanthobasidia can be seen to develop more or less numerously from acanthophyses in various species of *Stereum* subg. *Acanthostereum* as demonstrated by Jülich (1978: 472, fig. 13) in *S. illudens*, in *S. reflexulum* in this paper or in some *Aleurodiscus* as shown by Lemke (1964: 263, fig. 16) in *A. penicillatus* or again in *A. mirabilis* as seen by one of us (J. B. unpublished).

Examination of Table I reveals the relative importance of the different characters.

(1) Characters common to all species studied thus far: amyloid and binucleate spores

(2) Characters useful to distinguish genera.—

For *Aleurodiscus*: monomitism.

TABLE I
Comparative table of genera having acanthophyse-like elements

	<i>Acanthobasidium</i>	<i>Aleurodiscus</i> subgen.			<i>Xylobolus</i>	<i>Stereum</i> subgen.		
		<i>Aleurodiscus</i>	<i>Acanthophysium</i>	<i>Aleurobolus</i>		<i>Acanthostereum</i>	<i>Aculeostereum</i>	<i>Stereum</i>
Spores: amyloid pinkish ornamented binucleate (1)	+ ? + ?	+ + + +	+ - ± +	+ - - +	+ - - +	+ - - +	+ - - +	+ - - +
Sulfocystidia	-	-	+	+	(2)	-	-	-
Acanthohyphidia	(3)	±	±	+	+	+	(4)	-
Mitism (5)	I	I	I	I	II	II	II	II
Verticillate clamps (6)	-	-	-	-	-	+	+	+
Laccase	?	+	+	+	-	+	+	+

(1) for all species studied up to now

(2) the species of *Xylobolus* sensu stricto should be re-examined on fresh material. Weak reactions have moreover been noticed in specimens collected several months ago.

(3) acanthobasidia

(4) pseudocanthophyses

(5) mitism: I = monomitic, II = dimittic

(6) in culture

(7) except *Aleurodiscus apricans*.

For *Xylobolus*: alveolar rotting, absence of laccase, absence of verticillate clamps in cultures, and presence, as well in the carpophore as in culture, of an orange-yellow substance turning black in sulphuric acid.

For *Stereum*: verticillate clamps in cultures and absence of reactions with sulphuric acid or sulpho-aldehydes.

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Résumé

Les carpophores et cultures de deux *Stereum* à acanthophyses vraies sont décrits: *S. peculiare* nov. sp. de Sibérie et des Indes à l'hyménium ornementé, et *S. reflexulum* Reid retrouvé en abondance à Port-Cros (France). Le genre *Stereum* est découpé en 3 sous-genres: subg. *Stereum*, *Aculeatostereum* subg. nov. et *Acanthostereum* subg. nov., qui sont comparés aux autres ensembles pouvant posséder des acanthophyses (*Acanthobasidium*, *Aleurodiscus*, *Xylobolus*) et les caractères distinctifs de ces différents groupements sont soulignés.

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